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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
TAT, BINH C	
ART UNIT	**PAPER NUMBER**
2825	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/22/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/774,857	FUNG ET AL.	
	Examiner	Art Unit	
	Binh C. Tat	2825	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 02 January 2007.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-58,62 and 63 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-58,62 and 63 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 09 February 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to restriction/election file on 01/02/07. The examiner acknowledges: the election of group I, claims 1-58, and 62-63 without traverse. The applicant is advised to cancel non-election claims 59-61 in the next communication.

Claim Rejections - 35 USC § 101

2. Claim 1 rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The act of the claimed expresses an abstract idea of selecting routing resources to increase delay for connection without specifies any data, functional, or practical application is non-statutory, see MPEP 2106 [R-3].

3. Claim 33 is also rejected under 35 U.S.C. 101, because they are depending on claim 1.

4. Claim 48 is also rejected under 35 U.S.C. 101, because they are depending on claim 1.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-58, and 62-63 are rejected under 35 U.S.C. 102(b) as being anticipated by Matsuoto et al. (US Patent 2001/0049814).

6. As to claims 1, and 33, Matsuoto et al. teach a method for designing a system, comprising: determining minimum and maximum delay budgets for connections along a path by finding a set of connection delays that attempt to satisfy the short-path (see fig 8) and long-path

(see fig 9) timing constraints for the path (see fig 8 Fig. 9, paragraph 0089-00125); and selecting routing resources for the connections in response to the minimum and maximum delay budgets (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131).

7. As to claims 2, and 34, Matsuoto et al. teach wherein determining minimum and maximum delay budgets comprises considering lower and upper delay limits of routed connections based on potential routing possibilities (see fig 8 fig 9, fig 10, paragraph 0091-0120, and background).

8. As to claims 3, and 35, Matsuoto et al. teach wherein lower delay limits of the routed connections are determined based on an initial selection of routing resources that minimizes connection delays and ignores shorted signals (see fig 8 fig 9, fig 10, paragraph 0091-0120, and background).

9. As to claims 4, and 36, Matsuoto et al. teach wherein determining minimum and maximum delay budgets comprises starting with initial estimates of final routed delay (see fig 8 Fig. 9, paragraph 0089-00125 and summary).

10. As to claims 5, and 37, Matsuoto et al. teach wherein estimates of final routed delay are determined based on an initial selection of routing resources for connections that minimizes connection delay (see fig 8 Fig. 9, paragraph 0089-00125 and summary).

11. As to claims 6, and 38, Matsuoto et al. teach wherein estimates of final routed delay are determined based on an initial selection of routing resources for connections that ignores shorted signals (see fig 8 Fig. 9, paragraph 0089-00125 and summary).

12. As to claims 7, and 39, Matsuoto et al. teach wherein the short-path and long-path timing constraints are provided by a user (see fig 1-5 paragraph 0038-0060).

13. As to claims 8, and 40, Matsuoto et al. teach wherein determining minimum and maximum delay budgets for the connections comprises allocating short-path and long-path slack (see fig 8 Fig. 9, paragraph 0089-00125).

14. As to claims 9, and 41, Matsuoto et al. teach wherein allocating the delay in order to satisfy the long-path and short-path timing constraints comprises: performing short-path timing analysis to determined short-path slack values (see fig 8, 10 paragraph 0091-0107); fixing any short-path violations determined by the short-path timing analysis budgets (see fig 8, 10 paragraph 0091-0107); performing long-path timing analysis to determine long-path slack values (see fig 9 and fig 11 and paragraph 0109-0125); and fixing any long-path violations determined by the long-path timing analysis budgets (see fig 9 and fig 11 and paragraph 0109-0125).

15. As to claims 10, Matsuoto et al. teach wherein fixing any short-path violations comprises adding delay in response to the short-path slack values and connection weightings (see fig 8, 10 paragraph 0091-0107).

16. As to claims 11, Matsuoto et al. teach wherein the connection weightings are determined by a unit weighting scheme (see fig 8, 10 paragraph 0091-0107).

17. As to claims 12, Matsuoto et al. teach wherein the connection weighting is determined based on how much delay can be added before a practical limit is reached or all relevant violations are resolved (see fig 8, fig 9 paragraph 000091-0120 and background).

18. As to claims 13, Matsuoto et al. teach wherein fixing any long-path violations comprises subtracting delay in response to the long-path slack values and connection weightings (see fig 8, fig 9 paragraph 000091-0120 and background).

19. As to claims 14, and 42 Matsuoto et al. teach wherein allocating the long-path and short-path slack comprises: performing long-path timing analysis to determine long-path slack values (see fig 9 and fig 11 and paragraph 0109-0125); allocating long-path slack determined by the long-path timing analysis (see fig 9 and fig 11 and paragraph 0109-0125); performing short-path timing analysis to determine short-path slack values (see fig 8, 10 paragraph 0091-0107); and allocating short-path slack determined by the short-path timing analysis (see fig 8, 10 paragraph 0091-0107).

20. As to claims 15, Matsuoto et al. teach wherein allocating long-path slack comprises adding delay to temporary delays in response to the long-path slack values and connection weightings (see fig 9 and fig 11 and paragraph 0109-0125).

21. As to claims 16, Matsuoto et al. teach wherein the connection weightings are determined by a unit weighting (see fig 8, fig 9 paragraph 000091-0120 and background).

22. As to claims 17, Matsuoto et al. teach wherein the connection weighting is determined based on how much delay can be added before a practical limit is reached or all relevant slack is allocated (see fig 8, fig 9 paragraph 000091-0120 and background).

23. As to claims 18, Matsuoto et al. teach wherein allocating short-path slack comprises subtracting delay from temporary delays in response to the short-path slack values and connection weightings (see fig 8, fig 9 paragraph 000091-0120 and background).

24. As to claims 19, and 43, Matsuoto et al. teach wherein selecting routing resources for connections in response to the minimum and maximum delay budgets comprises re-selecting the routing resources for connections whose current proposed routes do not meet the minimum and maximum delay budgets (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131).

25. As to claims 20, and 44, Matsuoto et al. teach wherein selecting routing resources for connections in response to the minimum and maximum delay budgets comprises re-selecting the routing resources for connections that are shorted (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and summary).

26. As to claims 21, and 45, Matsuoto et al. teach wherein selecting routing resources for connections in response to the minimum and maximum delay budgets comprises decreasing minimum delay budgets based on the number of routing iterations that have occurred (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and summary).

27. As to claims 22, and 46 Matsuoto et al. teach wherein selecting routing resources for connections in response to the minimum and maximum delay budgets comprises increasing maximum delay budgets based on the number of routing iterations that have occurred (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and summary).

28. As to claims 23, and 47, Matsuoto et al. teach wherein selecting routing resources for connections in response to the minimum and maximum delay budgets comprises utilizing a cost function (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and summary).

29. As to claims 24, Matsuoto et al. teach wherein the cost function scores routing resources as candidates for selection in completing a connection route (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and summary).

30. As to claims 25, Matsuoto et al. teach wherein the lowest cost routing resource is efficiently tracked via use of a heap (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and background).

31. As to claims 26, Matsuoto et al. teach wherein the cost function for a routing resource is based, in part, on the delay of the respective routing resource (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and background).

32. As to claims 27, Matsuoto et al. teach wherein the cost function for a routing resource is based, in part, on a prediction of the delay to reach the destination from the respective routing resource (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and background).

33. As to claims 28, Matsuoto et al. teach wherein the cost function for a routing resource is based. in part, on how the total estimated routing delay of the connection if the routing resource is used compares with the minimum and maximum delay budget of the connection (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and background)

34. As to claims 29, Matsuoto et al. teach wherein the cost function for a routing resource is based, in part, on the number of competing signals that want to use the respective routing resource (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and background).

35. As to claims 30, Matsuoto et al. teach further comprising increasing the penalty associated with several competing signals wanting to use the same resource in the cost function as connection re- routing attempts occur (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and background).

36. As to claims 31, Matsuoto et al. teach further comprising increasing the penalty associated with several competing signals wanting to use the same resource in the cost function, based, in part, on how many signals wanted to use the resource in previous routing attempts (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and background).

37. As to claims 32, Matsuoto et al. teach further comprising increasing the penalty associated with several competing signals wanting to use the same resource in the cost function, based, in part, on how many routing iterations have occurred (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and background).

38. As to claims 48, Matsuoto et al. teach a system designer, comprising: a slack allocator unit that generates minimum and maximum delay budgets for connections along path from long-path and short-path timing constraints for the path provided by (see fig 8 Fig. 9, paragraph 0089-00125); and a routing unit that selects routing resources in a system to route the connections in response to the minimum and maximum delay budgets (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131).

39. As to claims 49, Matsuoto et al. teach wherein the slack allocator comprises a timing analysis unit that generates long-path and short-path slack values for the connections in response to connection delays and the long-path and short-path timing (see fig 8 Fig. 9, paragraph 0089-00125).

40. As to claims 50, Matsuoto et al. teach wherein the slack allocator comprises a delay adjustment unit that modifies a set of temporary connection delays in order to attempt to satisfy the long-path and short-path timing constraints (see fig 8 Fig. 9, paragraph 0089-00125).

41. As to claims 51, Matsuoto et al. teach wherein the slack allocator comprises a delay adjustment unit that modifies a set of temporary connection delays to allocate long-path and short-path slack (see fig 8 Fig. 9, paragraph 0089-00125).

42. As to claims 52, Matsuoto et al. teach wherein decreasing minimum delay budgets based on the number of routing iterations that have occurred comprises decreasing the minimum delay

budgets of connections that are competing for routing resources other connections want (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and summary).

43. As to claims 53, Matsuoto et al. teach wherein increasing maximum delay budgets based on the number of routing iterations that have occurred comprises increasing the maximum delay budgets of connections that are competing for routing resources other connections (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and summary).

44. As to claims 54, Matsuoto et al. teach wherein the cost function for a routing resource is based, in part, on the delay incurred reaching the respective routing resource from the connection source (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and background).

45. As to claims 55, Matsuoto et al. teach wherein the prediction of the delay to reach the destination from the respective routing resource is based, in part, on the minimum and maximum delay budget(see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and background).

46. As to claims 56, Matsuoto et al. teach wherein the short-path timing constraints comprises a hold time requirement (see fig 8, 10 paragraph 0091-0107).

47. As to claims 57, Matsuoto et al. teach wherein the short-path timing constraints comprises a minimum propagation delay (see fig 8, 10 paragraph 0091-0107).

48. As to claims 58, Matsuoto et al. teach wherein the short-path timing constraints comprises a minimum clock-to-output requirement (see fig 8, 10 paragraph 0091-0107).

49. As to claims 62, Matsuoto et al. teach wherein selecting routing resources for the connections in response to the minimum and maximum delay budgets increases delay for the connections (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and summary).

50. As to claims 63, Matsuoto et al. teach wherein the routing resources are programmable logic device routing resources (see fig 1, fig 8, fig 9 element 104, 0082-0088 and 00126-0131 and summary).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh C. Tat whose telephone number is 571 272-1908. The examiner can normally be reached on 7:30 - 4:00 (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Chiang can be reached on 571 272-7483. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Binh Tat
Art unit 2825
March 18, 2007

3/19/07
THUAN V. DO
PRIMARY PATENT EXAMINER